Tracking No	Time	Classification	Documentation		Subsystem
MER - 0	**MET:** Prelaunch	Problem	**FIAR**	**IFA** STS-44-V-01	INST, MPS
BSTR-02	**GMT:** Prelaunch		**SPR** 44RF04	**UA**	**Manager:**
			IPR 45V-0001	**PR**	
					Engineer:

Title: LO2 Temperature Sensor a Erratic Prelaunch (ORB)

Summary: DISCUSSION: At approximately 328:15:43:45 G.m.t. (launch minus 8 hours), the liquid oxygen (LO2) 17-inch manifold temperature probe A measurement (V41T1528A) operated erratically for 10 minutes before failing off-scale low. The temperature reading returned to near the normal value at approximately 328:18:00 G.m.t. At approximately 382:18:02:20 G.m.t., another 40-second period of erratic readings occurred, but then recovered with no subsequent anomalous readings for the remainder of the mission.

Following the flight, inspections, such as wiggle tests, connector checks, DSC/MDM input checks and continuity tests were performed on the vehicle with the transducer in place. However, these tests were performed after the MDM that processed the transducer's signals, MDM OA3, was removed and replaced due to a prior problem with a signal to the MDM. This prior problem was associated with a different card and channel than the LO2 temperature sensor A transducer and so is not believed to be at fault. Following the on-vehicle checkout and inspections, which revealed no anomalies, the sensor was removed and inspected, including X-rays, at KSC. No problems were found. The sensor has been sent to the vendor for further failure analysis. Additionally, MDM OA3 will be tested by the vendor. The sensor is a -20 type (ME449-0013-0020) that has not been subject to electrical or structural failures in the past. CONCLUSION: The LO2 17-inch manifold tempeature sensor A measurement exhibited erratic readings during the prelaunch time-frame most probably due to a transient open circuit condition caused by a faulty connection. Failure analysis of the sensor and its associated MDM is being performed to determine the exact cause of the anomaly. No structural failures were detected. CORRECTIVE_ACTION: The sensor was removed and replaced. EFFECTS_ON_SUBSEQUENT_MISSIONS: None. The erratic behavior is believed to be an isolated incident for this type (-20) of probe. Failure of the A sensor reading is covered by a redundant B temperature sensor.

Tracking No	Time	Classification	Documentation		Subsystem
MER - 0	**MET:** 000:07:42	Problem	**FIAR** JSC-EE-0666	**IFA** STS-44-V-02	GFE

INCO-03	**GMT:** 329:07:27		**SPR**	**UA**	**Manager:**
			IPR	**PR**	
					Engineer:

Title: Video Interface Unit Low Output Power (GFE)

Summary: DISCUSSION: During the STS-44 mission at around 7 hours 43 minutes MET, the crew reported that the video interface unit (VIU) ser. no. 1009 was not supplying power to the camcorder. The crew performed a troubleshooting procedure on the VIU and determined that all cables performed properly and that both VIUs were supplying video to the monitor. The voltage output from VIU 1009, however, was 7.2 V vs. the required value of 7.4 V for camcorder operation. This VIU was subsequently used as the video interface for the SPADVOS payload, which required video only. The good VIU was used for camcorder operations, and no further impact to mission operations was noted.

CONCLUSION: The VIU acts as an interface between the Orbiter power supply and the camcorder. To perform this function, the VIU has a built-in dc/dc converter, which requires time to build up to the current flow required by the camcorder. This characteristic, when combined with the impedance of the VIU/camcorder cabling and the Orbiter's dc power supply voltage level (28 V), tends to drop the voltage level at power-on to below the level that is required by the camcorder. This in turn causes the camcorder to suspect an undervoltage and subsequently shut itself down. This is the situation that occurred during the STS-44 flight. CORRECTIVE_ACTION: This problem has been corrected by increasing the output voltage of the VIU to a value of 7.6 ? .1 V dc. This level is high enough to overcome the low output voltage at power-on, yet not high enough to damage the camcorder. All VIUs will be adjusted in this manner. EFFECTS_ON_SUBSEQUENT_MISSIONS: None.

Tracking No	Time	Classification	Documentation		Subsystem
MER - 0	**MET:** 002:07:09	Problem	**FIAR** B-FCE-213-F008,	**IFA** STS-44-V-03	GFE
MMACS-01, MMACS-05	**GMT:** 331:06:54		B-FCE-312-F009	**UA**	**Manager:**
			SPR	**PR**	
			IPR None		**Engineer:**

Title: Treadmill Failure (GFE) (GFE)

Summary: DISCUSSION: While using the treadmill, the crew reported hearing "grinding" sounds that were followed a short time later by the treadmill belt locking up. The treadmills are rated for six flights and this treadmill was making its fifth flight. Postflight analysis reavealed that the top-bearing-plate flywheel-shaft bearing had frozen due to a lack of lubrication. The treadmill bearings do not have additional lubrication applied between flights.

During a subsequent alternative exercise period, the crew reported that the handle of the treadmill had broken off. A review of the alternative exercise protocol revealed that stresses were placed on the treadmill handle that it was not designated to withstand. CONCLUSION: The failure of the treadmill was caused by a lack of lubrication in the top-bearing-plate flywheel-shaft bearing. The failure of the bearing caused the treadmill belt to lock up. The failure of the treadmill handle was most likely caused by the application of stresses during the alternative exercise protocol that the handle was not designed to withstand. CORRECTIVE_ACTION: Initially, all treadmill bearings will be lubricated with an approved lubrication. Also, after each flight the treadmill bearings will be inspected and lubricated as necessary. Proper functioning of the treadmill will negate the need for alternative exercise protocols that may overstress treadmill components, thus no corrective action is deemed necessary for the handle failure. EFFECTS_ON_SUBSEQUENT_MISSIONS: None.

Tracking No	Time	Classification	Documentation		Subsystem
MER - 0	**MET:** 001:00:25	Problem	**FIAR** BFCE-029F042	**IFA** STS-44-V-04	GFE,INST
INCO-05	**GMT:** 330:00:10		**SPR**	**UA**	**Manager:**
			IPR 45V-0005	**PR**	
					Engineer:

Title: OPS Recorder 2 track 2 Data Dumps Poor Quality (GFE)

Summary: DISCUSSION: At 330:00:10 G.m.t., data dumps from operations (OPS) recorder 2 track 1 were of poor quality. The same data were dumped both in the forward and reverse directions at TDRS E, during revolution 11, TDRS S during revolution 15, and VTS. All dumps were poor in the reverse direction but were better in the forward direction although still not good. The OPS recorder 2 track 1 was again dumped to TDRS S during revolution 17 in both the forward and reverse directions. Data quality was good when dumped in the forward direction, but poor when dumped in the reverse direction. OPS recorder 2 track 1 was not used for the rest of the mission. No mission impact.

CONCLUSION: Troubleshooting at KSC confirmed the discrepancy. Headwear is the suspected problem. Headwear is a known problem and the recorders are being rebuilt on an attrition basis. The STS-44 OPS recorder 2 was on its ninth mission. Headware problems nominally appear on about the fourth mission. CORRECTIVE_ACTION: The OPS 2 recorder was removed and replaced. The removed unit will be returned to the vendor for failure analysis. EFFECTS_ON_SUBSEQUENT_MISSIONS: If this problem recurred during flight, a different track would be selected. No mission impact.

Tracking No	Time	Classification	Documentation		Subsystem
MER - 0	**MET:** 003:18:50	Problem	**FIAR**	**IFA** STS-44-V-05	ECLSS
EECOM-02	**GMT:** 332:18:35		**SPR** None	**UA**	**Manager:**
			IPR None.	**PR**	
					Engineer:

Title: HUM SEP B H2O Carry-over. (ORB)

Summary: DISCUSSION: At about 332:18:35 G.m.t., the crew reported that about one to two cups of free water was around the humidity separator B screen, and the humidity separator appeared to be spitting water.

Prior to the water carry-over, the crew was performing the procedure for the redundant component checkout for the cabin temperature controllers. The procedure requires the crew to transfer the control linkage from the primary controller to the secondary controller and then activate the secondary controller. Due to the planned length of the mission, the crew had powered down many systems on the Orbiter to conserve cryogenics. This power down resulted in a lower-than-normal heat load in the cabin. As a result of the lower heat load, the primary cabin temperature controller had moved to the full-heat setting. The full-heat setting allowed an excess build-up of moisture on the heat exchanger. At the time of the redundant component checkout, the secondary controller was positioned in the full-cool position. When the crew moved the control linkage from the primary to the secondary controller, switching the diffuser from full-heat to full-cool, the excess moisture that had accumulated on the heat exchanger was forced to the humidity separator as a slug of water. The size of the slug exceed the capacity of the humidity separator, and the excess was dumped into the lower equipment bay, where it was found by the crew. CONCLUSION: Based on the available flight data, crew comments, and the successful flush performed at KSC, the most probable cause of the humidity separator B water carry-over was a large slug of water being passed from the heat exchanger to the humidity separator during the redundant component checkout of the cabin temperature controllers. CORRECTIVE_ACTION: A change to the crew procedures is being prepared by the Mission Operations Directorate that will prevent the type of water carry-over seen during the redundant component checkout of the temperature controllers. This proposed procedure will modify the Ascent Checklist to pre-position the secondary controller actuator to the full-heat position. Manaual movement of the bypass valve from any position to a warmer position reduces the air flow over the heat exchanger and thus reduces the amount of water sent to the humidity separator. The secondary controller than automatically drives the bypass valve slowly to its proper position. EFFECTS_ON_SUBSEQUENT_MISSIONS: The proposed modification to the Ascent Checklist will prevent the type of water carry-over that was observed during the redundant component checkout of the cabin temperature controllers.

Tracking No	Time	Classification	Documentation		Subsystem
MER - 0	**MET:** 002:19:45	Problem	**FIAR**	**IFA** STS-44-V-06	ECLSS
EECOM-01	**GMT:** 331:19:30		**SPR** 44RF02	**UA**	**Manager:**
			IPR 45V-0016	**PR** PR6-200350-A	
					Engineer:

Title: Supply Water Dump Valve Leak (ORB)

Summary: DISCUSSION: Indications of a leaking supply water dump valve were seen after the second and fourth supply water dumps. The free fluid disposal in-flight maintenance procedure to purge supply water from the dump line was performed. Postflight troubleshooting was unable to reproduce the problem

A similar leak was observed on the last flight of OV-103 (STS-48). The supply dump valve assembly was removed and shipped to JSC for installation in a vacuum test chamber in an attempt to reproduce the on-orbit leak. The vacuum chamber tests have yet to reproduce the problem; however, new orientations of the valve assembly will be tried in an attempt to reproduce the leak. A review of the data from previous flights revealed that a similar leak went undetected on STS-29 and STS-39, both flights of OV-103, and that it is suspected to have occurred on the OV-103 flight of STS-33 and the OV-104 flights of STS-43 and STS-61B. There were no supply water dump problems encountered on any of these missions. CONCLUSION: The most probable cause of the "burping" observed after the supply water dumps was that water was trapped in the dump valve. As this water froze, it expanded causing the dump valve to open slightly. Once opened, the valve allowed water to flow, and that melted the ice and allowed the valve to close again. After each "burp", the amount of water that remained behind the valve was smaller. The burping cycle continued until all of the water behind the dump valve had sublimated away. CORRECTIVE_ACTION: Although a leak in the supply dump valve is not normal, it does not present a safety-of-flight issue. At no time was the ability to dump supply water hampered, although there is a remote possibility that the line could freeze. Should this anomaly cause a supply water dump problem, the supply water can be dumped through the flash evaporator system (FES). A leak check was performed on this valve at KSC with no leakage detected. The next flight of OV-104 (STS-45) is scheduled to dump all of the supply water using FES dumps, with no use of the supply dump line planned. Therefore, no corrective action is deemed necessary and it is recommended to fly the existing supply dump valve. EFFECTS_ON_SUBSEQUENT_MISSIONS: None.

Tracking No	**Time**	**Classification**	**Documentation**		**Subsystem**
MER - 0	**MET:** 005:15:45	Problem	**FIAR**	**IFA** STS-44-V-07	GN&C
GNC-01	**GMT:** 334:15:30		**SPR** 44RF01	**UA**	**Manager:**
			IPR 45V-0006	**PR**	
					Engineer:

Title: Inertial Measurement Unit 2 Fail (ORB)

Summary: DISCUSSION: At 334:15:30 G.m.t., during the STS-44 mission, the inertial measurement unit (IMU) 2 Z-axis acceleration channel and the redundant gyro monitor (RGM) both went into saturation. The Z-axis acceleration channel indicated 496 ft/sec (approximately 14400 pulses) and the RGM indicated 5.77 deg/sec. In an attempt to recover normal operation of the IMU, it was first placed in standby, then operate, and was later power cycled. These actions were not successful. Subsequent analysis indicated that the RGM had not failed, but was responding accurately to the saturated Z-axis acceleration channel. On-orbit, the redundant gyro monitor is compensated for Z-axis acceleration.

For the remainder of the flight the IMU remained powered and in operate mode, but remained deselected as a source of onboard navigation. This configuration allowed continued ground monitoring of IMU 2. CONCLUSION: Postflight troubleshooting in the Inertial Systems Laboratory (ISL) at JSC isolated the problem to a failed computer interface card. This card converts analog acceleration signals into digital signals. The failed card was sent to the manufacturer for further analysis, and this revealed that a filter capacitor (C14), located within a chopper-stabilized amplifier hybrid component (U12) in the Z-acclerator channel, had shorted. This short circuit in turn caused a bond wire from U12 pin 9 to the card case to fuse open. No failure history for this particular hybrid component failure mode exists. This is not a generic problem and should not represent any impact to future missions. Furthermore, the new HAINS IMUs do not contain these types of cards, which are unique to the KT-70

IMUs. A DPA of the shorted capacitor is in work. CORRECTIVE_ACTION: The failed IMU has been removed and replaced. Further action will be determined based on the results of the DPA of the failed capacitor. EFFECTS_ON_SUBSEQUENT_MISSIONS: None.

Tracking No	Time	Classification	Documentation		Subsystem
MER - 0	**MET:** 001:00:25	Problem	**FIAR** B-FCE-029-F044	**IFA** STS-44-V-08	GFE
INCO-06	**GMT:** 330:00:10		**SPR**	**UA**	**Manager:**
			IPR	**PR**	
					Engineer:

Title: Close Circuit Television System Camera B Degraded Image (GFE)

Summary: DISCUSSION: During an STS-44 TV downlink, horizontal white lines were evident throughout the picture. This is indicative of a degrading power supply. This failure presented no impact to mission operations.

CONCLUSION: Camera B was removed and tested at KSC. No white line were evident during this test. The camera has been shipped to Boeing FPAC. CORRECTIVE_ACTION: Camera B was removed and replaced with a functioning camera. EFFECTS_ON_SUBSEQUENT_MISSIONS: None.

Tracking No	Time	Classification	Documentation		Subsystem
MER - 0	**MET:** 006:22:40	Problem	**FIAR**	**IFA** STS-44-V-09	D&C, MECH
None	**GMT:** 335:22:25		**SPR** AD1487	**UA**	**Manager:**
			IPR 45V-0023	**PR**	
					Engineer:

Title: The Left Air Data Probe Experienced A Single-Motor Deployment Sequence (ORB)

Summary: DISCUSSION: Analysis of flight data indicates that the left-hand air data probe (ADP) motor number 2, which is powered from AC Bus 2 via forward motor control assembly (FMCA) number 2, did not run during the entire deployment sequence which was initiated at 335:22:35:39 G.m.t. Deployment required 25 seconds versus the nominal dual-motor deployment time of approximately 15 seconds. Data analysis further revealed that the FMCA 2 Operate Status 3 event (V76X2123E), which indicates closure of relay K8 in FMCA 2, went to the correct state for approximately 1 second, then reverted to its previous state. Bus currents also indicated that motor number 2 operated during this 1-second period.

The postlanding stowage sequence was normal which indicates that both motors operated when the probe was stowed. Postflight troubleshooting consisted of single and dual motor drive tests, both of which were also normal. However, technicians were able to reproduce the anomaly by careful manipulation (teasing) of the DEPLOY switch (S8, Panel C3). This problem has previously been experienced on OV-104 during ground testing on August 17, 1986, (reference CAR AD1487). Investigation at that time revealed no wiring or panel problems, but did confirm that both the ADP toggle switches could be placed in the center (DEPLOY) position in such a manner that all poles were not electrically closed. Furthermore, it was found that by exerting a slight pressure on the switch actuator, contacts on a single pole could open after having been closed. This would result in the scenario observed on STS-44. CONCLUSION: The most probable cause of this anomaly was a recurrence of the previously documented "switch teasing" phenomena. The tendency of a switch of this type to exhibit these characteristics is a function of the actuator-operating technique and is not considered a failure of the switch. It is more common in the 4-pole level-lock type that is used in this application. Some switches may tend to exhibit this characteristic more readily than others of the same type. CORRECTIVE_ACTION: The corrective action documented on CAR AD1487 continued to apply. Crew members will be briefed on the most effective operating technique for prevention of the phenomena. EFFECTS_ON_SUBSEQUENT_MISSIONS: None. Single-motor deployment of an air data probe is not a mission impact.

Tracking No	Time	Classification	Documentation		Subsystem
MER - 0	**MET:** 004:02:29	Problem	**FIAR**	**IFA** STS-44-V-10	APU
MMACS-04	**GMT:** 333:02:14		**SPR** 44RF03	**UA**	**Manager:**
			IPR 45V-0009	**PR**	
					Engineer:

Title: APU 2 Drain Line Pressure Drop (ORB)

Summary: DISCUSSION: During the fourth day of the on-orbit period, auxiliary power unit (APU) 2 drain line pressure (V46P0290A and V46P0291A) began to decay over a 75-minute period. The pressure decreased from 15.5 psia to 3.5 psia. Then the leak stopped and the drain line pressure remained steady. The normal reseat pressure of the relief valve is 20.4 to 16.8 psia. Preflight, the drain line had been vented twice due to static leakage from the fuel pump manifold to the seal cavity (reference waiver WK2331R1). The pump inlet pressure held steady during the on-orbit pressure decay. APU 2 was used during the flight control system check-out, and no anomalous conditions were noted in the data, nor was any further leakage noted from the drain line system.

CONCLUSION: Because of the preflight static leak, a small amount of hydrazine contamaination may have been present in the drain line system. A postflight sniff check was performed that indicated no external hydrazine leakage. The most probable cause for this leakage is a gas leak through the drain line relief valve that was caused by contamination. The pressure decay is similar to APU 1 on STS-48, when the pressure decayed from 18 psia to 13 psia over a three-day period, then became steady, and no hydrazine was sniffed postflight. This pressure decay has been seen on several other flights (STS-4, -6, -7, -8, and -39). CORRECTIVE_ACTION: The APU 2 drain line relief valve will be removed and replaced with a new design (-003) relief valve. The removed valve will be sent to MAB laboratory for failure analysis. The failure analysis will be tracked by CAR 44RF03-010. APU 2 was removed and replaced with an improved APU which has an improved fuel pump shaft seal to reduce the amount of static leakage into the drain line. EFFECTS_ON_SUBSEQUENT_MISSIONS: None.

Tracking No	Time	Classification	Documentation		Subsystem
MER - 0	**MET:** 006:22:25	Problem	**FIAR**	**IFA** STS-44-V-11	APU
MMACS-06	**GMT:** 335:22:10		**SPR** None	**UA**	**Manager:**
			IPR 45V-0010	**PR**	
					Engineer:

Title: APU Drain Line Temperature Rose During Entry (ORB)

Summary: DISCUSSION: During entry, approximately 20 minutes after auxiliary power unit (APU) 1 start, the seal cavity drain line temperature 2 measurement (V46T0270A) increased from 111 to 196 ?F. The temperature went from 111 to 170 ?F in approximately 8 seconds, then dropped to 155 ?F. Two minutes later, the line temperature increased from 156 to 196 ?F in approximately 11 seconds. This final temperature increase triggered the fault detection and annunciation (FDA) which is set at 195 ?F. No crew action was taken to turn off the APU 2 drain line heaters since the temperature began a slow decrease immediately after the FDA alarm. Similar rapid temperature increases were noted on this system during ascent and also on previous missions (on other APU's) while the APU was running, although not to this magnitude.

The drain line was purged and drained after the flight. The amount of liquid collected was approximately 6 cc. An analysis of the liquid was not performed because the sample was inadvertently destroyed. During the improved APU (IAPU) installation, the drain line with a bonded temperature sensor was removed and replaced. The heaters were removed from the old line and installed on the new line. The heater system and temperature sensor are scheduled for functional testing to verify the installation of the hardware. However, no testing was performed on the post STS-44 drain configuration. CONCLUSION: The most probable cause of the temperature increase is a warm slug of liquid (either hydrazine and/or lube oil) that migrated through the line near the temperature sensor triggering the FDA limit. CORRECTIVE_ACTION: A new drain line and new temperature sensor were installed in position 2 due to the IAPU installation. Electrical and functional testing on the drain line heater system is scheduled prior the next flight. Additionally, the IAPU will separate the lube oil from the fuel in the seal cavity area which prevents lube oil from draining into the drain system and reduces the amount of heat being transferred from the gearbox into the liquid (fuel) within the drain system. EFFECTS_ON_SUBSEQUENT_MISSIONS: None.

Tracking No	Time	Classification	Documentation		Subsystem
MER - 0	**MET:**	Problem	**FIAR** JSC-SD-6053	**IFA** STS-44-V-12	GFE
None	**GMT:**		**SPR**	**UA**	**Manager:**
			IPR None	**PR**	
					Engineer:

Title: DDU Filter Cleaning Tool Broke (GFE)

Summary: DISCUSSION: The crew reported that while using the new data display unit (DDU) filter cleaning tool to clean the DDU filters, the tool broke. The break occurred at the joint between the base of the tool and the extension tube. The crew used gray tape to repair the tool and continued to use the tool for the DDU filter cleaning tasks.

This was the first flight of this tool. Postflight analysis revealed that the threads in the Teflon extension tube were cut too deep. Additionally, it was found that the metallic label containing the part number was affixed to the Teflon tube approximately 1/2-inch above the threads. The label had the effect of stiffening the tube. The deep cut along with a chemical used to treat the threads of the Teflon tube weakened the tube to the point that it failed at the interface to the metal adapter when the tube was flexed during use. CONCLUSION: The failure was most likely caused by the combination of a deep cut in the threads of the Teflon tube, the metallic label placement, and the chemical treatment of the threads after they were cut. Each of these contributed to the weakening of the Teflon tube, and it became brittle and broke at the interface to the DDU filter cleaning adapter. CORRECTIVE_ACTION: A new tool is being manufactured for use on STS-42. The threaded portion that failed on STS-44 has been eliminated. The Teflon extension tube has been secured with a brass ferrule that has been crimped onto the end of the tube. The end of the tube with the ferrule is press-fit into the metal adapter. This change will prevent the tube from separating from the metal adapter as well as eliminate the weak tube cross-section which previously existed in the threads. It also allows the Teflon tube to be rotated in the metal adapter, a feature the previous design lacked. Additionally, the metal label containing the part number is now affixed to the metal adapter. EFFECTS_ON_SUBSEQUENT_MISSIONS: None.

Tracking No	Time	Classification	Documentation		Subsystem
MER - 0	**MET:** 006:22:05	Problem	**FIAR**	**IFA** STS-44-V-13	HYD
None	**GMT:** 335:21:50		**SPR** 44RF05	**UA**	**Manager:**
			IPR 45V-0013	**PR**	
					Engineer:

Title: HYD SYS 1 Priority Valve Sluggish (ORB)

Summary: DISCUSSION: When the hydraulic system 1 main pump pressure was switched from low to normal at approximately EI-13 minutes, the bootstrap accumulator pressure lagged the main pump pressure by 1.039 seconds before instantaneously rising to an equal pressure. No lag should have occurred in the equalization of these pressure. The flight specification is no more than 1-second delay between the pressures. After pressure equalization, the system performed nominally for the remainder of the auxiliary power unit operation.

Flight data indicated that the hydraulic system 1 accumulator pressure and reservoir pressure tracked each other during the period before and after the lag occurred, which implies that the check valve internal to the priority valve was sluggish to open. Similar lags were experienced on STS-27 (OV-104) system 2 during ascent and entry, on STS-41 (OV-103) system 3 during entry, and on STS-37 (OV-104) system 2 during entry. Examination of the priority valves has revealed contamination to be the probable cause of the lag.   CONCLUSION: The delay in hydraulic system 1 accumulator pressure reflecting the main pump pressure was most probably the result of a restriction in the movement of the check valve internal to the priority valve.   CORRECTIVE_ACTION: The hydraulic system 1 priority valve will be removed and replaced. A failure analysis will be performed to determine the cause of the problem. Improvements to the hydraulic bootstrap system to minimize susceptibility to contamination are currently being addressed by MCR 16598. MCR 16598 has been approved; however, funding is still pending.   EFFECTS_ON_SUBSEQUENT_MISSIONS: None.

Tracking No	Time	Classification	Documentation		Subsystem
MER - 0	**MET:** Postlanding	Problem	**FIAR**	**IFA** STS-44-V-14	MECH
None	**GMT:** Postlanding		**SPR** 44RF06	**UA**	**Manager:**
			IPR	**PR** PYR-4-11-0142	
					Engineer:

Title: Loss of Hardware from ET Umbilical Attachment System (ORB)

Summary: DISCUSSION: An assembly consisting of a NASA Standard Initiator (NSI), electrical connector, and lockwire fell from the external tank (ET)/Orbiter liquid hydrogen (LH2) umbilical cavity upon ET door opening. The assembly part numbers identified the object as coming from one of the three umbilical plate assemblies (attach canister).

CONCLUSION: An accounting of the debris in the LH2 umbilical plate assemblies determined a similar piece of debris was lost on-orbit. The debris on the runway and the debris lost on orbit came from the forward and aft locations on the LH2 umbilical plate assembly. The present design of the debris canister does not use a hole plugger device; therefore, debris can escape through the hole left by the bolt. Debris has been found on the runway and missing from the debris canister on other missions. CORRECTIVE_ACTION: A new hole plugger design, MCR-11960, has been approved for the umbilical plate assembly. OV-105 was delivered with the new design. The new design is scheduled to be installed prior to flight 13 of OV-102, flight 15 of OV-103 (OMDP), and flight 13 of OV-104 (OMDP). As stated in other debris related problem reports, the probability of a debris fragment preventing ET door closure is considered remote; however, immediate installation of the hold plugger hardware would eliminate this risk. The hardware is available for immediate installation in the remaining vehicles.   EFFECTS_ON_SUBSEQUENT_MISSIONS: None.

Tracking No	Time	Classification	Documentation		Subsystem
MER - 0	**MET:** 002:21:36	Problem	**FIAR** B-FCE-029-F043	**IFA** STS-44-V-15	GFE
INCO-07	**GMT:** 331:21:21		**SPR**	**UA**	**Manager:**
			IPR None.	**PR**	
					Engineer:

Title: VTR Door Jam (GFE) (GFE)

Summary: DISCUSSION: The crew reported that the VTR door had jammed and had to be pried open. Subsequently, the door could not be fully closed unless the crew forced both sides of the door down. When the door was completely closed, the VTR worked properly.

Postflight inspection revealed damage to the cassette compartment. The damage was indicative of the tape not being fully wound onto the cassette reels when an attempt is made to eject the tape. It has been observed on previous flights that the tape will unwind from the cassette reels in zero-g if the hub locks are not installed. Whenever a cassette is removed from the VTR, the crew has been trained to immediately install the hub locks in order to keep the tape wound tightly on the reels. CONCLUSION: The most probable cause of the VTR door jam was that a cassette with tape that was not wound tightly on the reels became caught in the VTR when an attempt was made to eject the cassette. Subsequent problems with the VTR door were the result of the door being pried open after the jam. CORRECTIVE_ACTION: The cassette compartment has been replaced. A procedure has been established by the Flight Equipment Processing Contractor to verify that the tape in the cassette has been fully rewound before the hub locks are installed. This will prevent ground processing errors from being the cause of loose tape on the cassettes. EFFECTS_ON_SUBSEQUENT_MISSIONS: None.

Tracking No	Time	Classification	Documentation		Subsystem
MER - 0	**MET:** 006:18:45	Problem	**FIAR**	**IFA** STS-44-V-16	D&C
None	**GMT:** 335:18:30		**SPR** 44RF07 (port), 44RF08 (starboard)	**UA**	**Manager:**
				PR	
			IPR 45V-0018		**Engineer:**

Title: The Mid-port and Mid-starboard Payload Bay Floodlights Failed (ORB)

Summary: DISCUSSION: When the floodlights were activated for payload bay door closure at 335:18:30 G.m.t., the mid-port lamp flickered and the mid-starboard lamp failed to illuminate. All floodlights had operated satisfactorily during a previous lamp test. Postflight troubleshooting failed to reproduce either anomaly.

Beginning with its sixth flight (STS-36), OV-104 has experienced several inflight floodlight anomalies. Some have been attributed to failed lamps, but others remain unexplained. The mid-starboard lamp was most recently replaced during the STS-44 flow. Troubleshooting revealed arcing, for which an engineering fix has been approved and will be implemented on an attrition basis. The aft-port floodlight and its associated floodlight electronics assembly (FEA) had been replaced after a failure on STS-36. This mid-port floodlight anomaly has been unexplained since STS-36. A suspect bulkhead connector associated with FEA 1 was removed and replaced during the STS-44 flow, but failure analysis determined that this was not the cause of the previous mid-port anomaly. The tendency of a floodlight to either flicker or fail to start is related to the magnitude of the starting pulse generated by the FEA. Engineering analysis of FEA design and test data indicates that the magnitude of the starting pulse may vary between units, and that it may be temperature sensitive. It is noted that several of the unexplained failures occurred immediately prior to payload bay door closure, after the vehicle had been in a coldsoak attitude. CONCLUSION: Although the mid-port and mid-starboard floodlight anomalies are unexplained, it is presently believed that the most probable cause is insufficient magnitude of the starting pulse due to temperature effects and variations between individual FEA's and lamp assemblies.

CORRECTIVE_ACTION: Since the payload bay floodlights will not be used during the STS-45 mission due to payload constraints, no hardware will be replaced during this flow. An engineering change is being processed which will improve the FEA starting pulse characteristics. EFFECTS_ON_SUBSEQUENT_MISSIONS: Random floodlight failures may continue to occur until the cause is fully understood and corrected. The number of floodlights required is mission dependent. The most critical floodlight is the one on the forward bulkhead since it may be required for back-up visual verification of the payload bay door latches. This floodlight is of a slightly different design and has experienced no inflight failures.

Tracking No	Time	Classification	Documentation		Subsystem
MER - 0	MET: Prelaunch	Problem	FIAR	IFA STS-44-V-17	FCS
None	GMT: Prelaunch		SPR 44RF09	UA	Manager:
			IPR	PR MV-0610A-3-0019,	
				LAF-4-11-0200	Engineer:

Title: MS2 Shoulder Harness Would Not Tighten (ORB)

Summary: DISCUSSION: During the STS-44 postflight crew debriefing, Mission Specialist 2 (MS2) stated that the adjuster mechanism on his left shoulder belt failed before launch at approximately T-20 minutes. The adjuster C-clip and lock bar became disassembled and were lost in the crew module. This prevented tension from being maintained on the left shoulder belt. The MS2 crewman then knotted the left-hand shoulder belt to maintain tension during launch and landing. KSC is presently attempting to locate the missing parts under a lost-and-found PR. The search has been unsuccessful at the time of this writing.

A similar problem occurred on a launch attempt for STS-30. The cause of this problem was found to be a missing C-clip, and the corrective action was to implement an OMRSD requirement to inspect seats for the presence of C-clips before every flight. The STS-42 MS2 seat inspection verified the presence of the C-clip. CONCLUSION: The cause of the MS2 shoulder harness failure is presently unknown. The most likely cause was loss of the C-clip; however, how the C-clip was lost after the inspection is unexplained. Further analysis can only be performed if the missing pieces are located in the OV-104 crew module. The listed CAR will report any further analysis. CORRECTIVE_ACTION: The failed MS2 adjuster mechanism has been removed from the flight inventory. Further corrective action may result from failure analysis of the missing piece parts, if they are found. EFFECTS_ON_SUBSEQUENT_MISSIONS: None.

Tracking No	Time	Classification	Documentation		Subsystem
MER - 0	MET: Postlanding	Problem	FIAR	IFA STS-44-V-18	MECH, LDGR
None	GMT: Postlanding		SPR 44RF10	UA	Manager:
			IPR	PR MEQ-4-11-0417	
					Engineer:

Title: Postflight Inspection Revealed Two Cracks (1/2"-3/4") on the Right Inboard Brake Rotor (ORB)

Summary: DISCUSSION: The postflight inspection of the carbon brakes revealed cracks and chips adjacent to one drive lug on the right-hand inboard brake (RHIB) rotor number 2. These cracks are the first recorded occurrence since carbon brake implementation.

Landing detailed test objective (DTO) number 520 was performed during the roll-out of STS-44 with the intent of obtaining runway friction coefficient data by rolling to a stop without braking. However, the pilot was running out of runway and applied brakes beginning at 15 knots for 12 seconds. The landing data shows that the RHIB had the highest brake pressure of 624 pounds per square inch (psi) versus an average of 406 psi for the other three brakes. On previous carbon brake flights, the typical peak brake pressures ranged from 540 psi to 1573 psi. However, the hydraulic system is capable of applying 2000 psi to the brake pucks. The braking energy and its onset rate incurred during STS-44 braking was very low (0.5 million ft-lb) compared to previous flights at 30 million ft-lb. There is currently no experience with anomalies under low speed/low torque braking. The only other occurrence of rotor damage was documented during carbon brake development testing. High torque at low speed did damage rotors at the drive lugs with an overstress condition typically producing anomalies in the area directly under the drive clips. However, the damage did not reduce brake capability to perform its intended design function. The brakes were sent back to the manufaturer for teardown inspection and analysis which began December 18, 1991. The manufacturer reported that the rotor was built off of the assembly line. During the build-up of the brakes, the rivets were compressed deeply during installation. This added pressure causing the carbon to crack at the rivets. The manufacturer has recognized this problem and implemented new procedures on clinching the rivets. CONCLUSION: The cracking of the carbon brake was due to improper workmanship. The procedure has been modified to prevent future defects. There have been no previous occurrences from the six previous carbon brake flights. The brakes are inspected prior to Orbiter Processing Facility (OPF) roll-out. The brakes will be inspected for the manufacturing defect. CORRECTIVE_ACTION: The brake manufacturing process has been modified to prevent future defects. EFFECTS_ON_SUBSEQUENT_MISSIONS: None.